Project design document form for CDM project activities

(Version 08.0)

Complete this form in accordance with the Attachment "Instructions for filling out the project design document form for CDM project activities" at the end of this form.

PROJECT DESIGN DOCUMENT (PDD)	
Title of the project activity	Wind power project at Jaibhim by SIIL
Version number of the PDD	11
Completion date of the PDD	14/09/2016
Project participant(s)	Serum Institute of India Limited
Host Party	India
Applied methodology(ies) and, where applicable, applied standardized baseline(s)	Selected Methodology: ACM0002 "Grid-connected electricity generation from renewable sources", Version 12.3.0 EB 66
Sectoral scope(s) linked to the applied methodology(ies)	Sectoral scope: 01: Energy industries (renewable / non-renewable sources)
Estimated amount of annual average GHG emission reductions	52,898 tCO_2

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

Serum Institute of India (SIIL) is a manufacturer of immune-biologicals, including vaccines in India. It was incorporated in the year 1984. The company is managed by the Poonawalla group. Today, Serum Institute of India Ltd. has established itself as the world's largest producer of Measles and DTP group of vaccines.

With the growing concerns for the environment, Serum Institute of India Ltd. (SIIL) has undertaken measures to reduce the GHG emissions by conceptualizing and installation wind power project in Maharashtra with efficient utilization of the available wind energy. Initially, it was decided that 18 WTGs of 2.1 MW each would be set up as part of this project activity. However, during project implementation, only 16 WTGs were commissioned. The generated electricity is wheeled to substation through a 33 kV overhead line. The generated electricity will displace equivalent electricity that may have been produced majorly from conventional fuels (generally, fossil fuels).

The project will be utilizing wind energy for generating clean electricity for captive use, sale to third party (directly or through power exchange) or sale to grid which would have otherwise been generated through fossil fuel dominated power plants, contributing to reduction in specific emissions (emissions of pollutant) including GHG emissions and also reducing its dependence on fossil fuels for energy requirements.

In the pre-project scenario, the project proponent used the electricity from the NEWNE grid for its internal power consumption. Thus, the project displaces the electricity from the grid and hence, the electricity grid has been taken as the baseline to the project activity as further demonstrated in Section B.4of this document. Emission reductions will be claimed on the net electrical energy that is generated for captive use, sale to third party (directly or through power exchange) or to the grid. Details of monitoring of emission reductions and their calculation have been provided in Section B.6.1 &Section B.7.3 of this document.

SIIL will be developing this project keeping in consideration of the funding available under the Clean Development Mechanism (CDM) of the United Nations Framework Convention on Climate Change. This is because the project activity qualifies as a CDM project as it would be generating and utilizing the clean power thereby helping in significant reduction of GHG emissions. The project activity is also responsible for sustainable economic growth and conservation of environment through use of wind as a renewable source. The generated electricity is to displace equivalent electricity (generated from fossil sources) that is being supplied by the Maharashtra State Electricity Distribution Company Ltd. (MSEDCL).

Sustainable Development criteria of the CDM project activity under consideration

For Clean Development Mechanism (CDM) in India, the National CDM Authority (NCDMA) has stipulated four indicators on sustainable development. For the project activity under consideration, the contribution made to each of the indicators is explained below:

1. **Environmental well being:**
   - **Mitigation of GHG emissions**: The project activity will use a clean and renewable source of energy i.e. wind for generating electricity. The avoidance of use of fossil fuels in the project activity will considerably reduce GHG emissions on a local as well as global level.
   - **Conservation of fossil fuels**: The project activity will eliminate the consumption of fossil fuels for power generation. Therefore, it will directly contribute to conservation of the limited stock of non-renewable resources (like coal, oil, etc.).

2. **Social well being:**

- **Local employment opportunities**: The project activity will result in generating local employment opportunities for the people. Further, setting up of a CDM activity in the region will increase awareness amongst the local population and will thus lead to the capacity building of the local people.

3. **Economic well being:**
   - **Development of the local region**: The project activity is located in a rural area. The successful execution of the project activity will lead to an improvement of the local infrastructure and contribute in the development of the region.

4. **Technological well being:**
   - The project activity involves the successful installation and operation of state-of-art wind turbine generators (WTGs) manufactured by Suzlon. The implementation of these new technologies will encourage the usage of efficient technology and large capacity wind mills.

A.2. Location of project activity

A.2.1. Host Party

India

A.2.2. Region/State/Province etc.

Western Region / State: Maharashtra

A.2.3. City/Town/Community etc.

Village: Jaibhim
District: Dhule

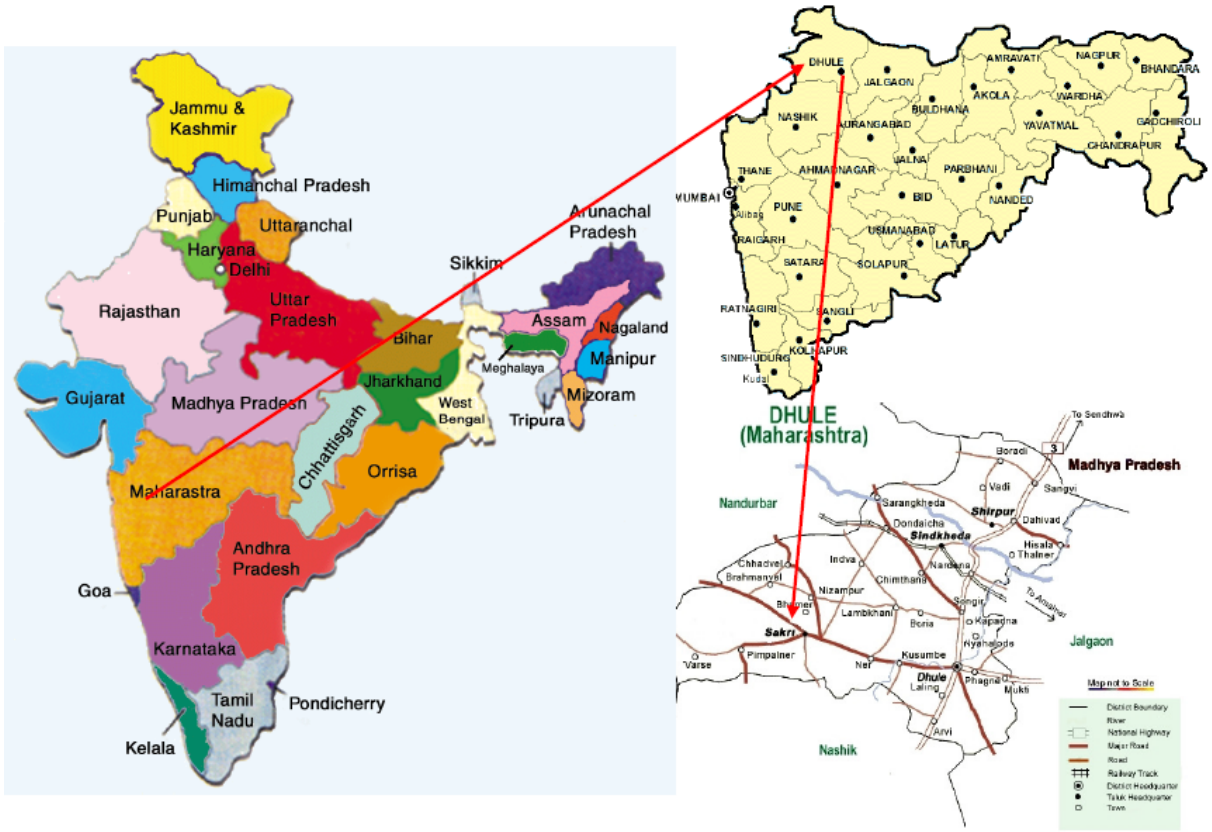
A.2.4. Physical/Geographical location

The project activity is located in Maharashtra state of India. The project location is attached in the figure below. The project site is located at Jaibhim in the Dhule district of Maharashtra. The nearest airport is Mumbai Airport which is at a distance of 334 km and the nearest railway station is Dhule.

The unique location information of the WTG is provided in the table below. The WTG numbers indicated in the table below are unique identification number provided by the state utility.

Location No.	Village	District	Latitude	Longitude	Gut no.
JAI-02	Runmali	Dhule	21º 7' 48"	74º 16' 3"	95/1
JAI-03	Runmali	Dhule	21º 7' 36"	74º 16' 4"	79/3
JAI-04	Vaskhedi	Dhule	21º 7' 20"	74º 15' 58"	87
JAI-05	Jaitane	Dhule	21º 7' 41"	74º 18' 15"	129/2
JAI-07	Runmali	Dhule	21º 8' 16"	74º 18' 24"	46
JAI-08	Vajdare	Dhule	21º 8' 43"	74º 18' 31"	109
JAI-09	Akhade	Dhule	21º 7' 54"	74º 20' 54"	122
JAI-11	Jaitane	Dhule	21º 7' 24"	74º 20' 49"	582/3 & 582/4
JAI-18	Shivajinagar	Dhule	21º 5' 42"	74º 20' 15"	124/1
JAI-19	Shivajinagar	Dhule	21º 5' 26"	74º 20' 11"	116

JAI-21	Shivajinagar	Dhule	21º 5' 20"	74º 19' 39"	124/3
JAI-22	Shivajinagar	Dhule	21º 5' 29"	74º 18' 59"	386/3 & 386/4
JAI-23	Bhamer	Dhule	21º 5' 41"	74º 19' 11"	391/1
JAI-27	Bhamer	Dhule	21º 5' 10"	74º 18' 30"	370
JAI-28	Bhamer	Dhule	21º 5' 0"	74º 17' 45"	113 & 313/1
JAI-29	Bhamer	Dhule	21º 5' 17"	74º 17' 39"	315/2



A.3. Technologies and/or measures

It is to be noted that the project activity is a greenfield project for generation of electrical energy using wind which is a renewable source of energy. Thus, this project actually displaces the electricity grid which is essentially fossil-fuel based.

In wind energy generation, kinetic energy of the wind is converted into mechanical energy and subsequently into electrical energy. Wind turbines capture the wind's energy with three rotor blades, which are mounted on a rotor, to generate electricity. The turbines sit high atop towers, taking advantage of the stronger and less turbulent wind. As the wind blows through the blades of the windmill, a pocket of low-pressure air forms on the downwind side of the blade. The low-pressure air pocket then pulls the blade towards it, causing the rotor to spin. The rotor turns the three-stage gearbox with flexible coupling that further spins the connected asynchronous induction generator. The spinning of this generator produces the required electricity. Since power is generated from wind energy, no emissions are attributed to the project emissions and emissions due to fossil-fuel dominated grid power has been displaced due to the project activity. Detailed information of gases & emission sources in baseline & project activity have discussed in Section B.3 of this document.

Emission reductions will be claimed on the net electrical energy that is generated for captive use, sale to third party or to the grid. Details of monitoring of emission reductions and their calculation have been provided in Section B.6.1 & Section B.7.3 of this document.

For the project activity, the project proponent has procured 16 WTGs from Suzlon each with a capacity of 2,100 kW each. The salient features of the technology employed are:

WTG Model: S88_2.1 MW

Lifetime	20 years
Rated Power	2,100 kW
Rotor diameter	88 m
Swept area	6082 m2
No. of blades	3
Cut in wind speed	4 m/s
Cut out wind Speed	25 m/s
Rotor Speed	15-17.6 rpm
Hub Height	80 m
Generator Type	Asynchronous
Insulation	Class H

Generation of power through wind turbine has no sources of emission as discussed in detail in SectionB.3 of this document. The electricity generated is monitored using electrical meters (Main & Check meters) which provide a measure of the actual electrical energy that would have been sourced from a fossil-fuel dominated power plants in the absence of the project activity. Hence, the fossil-fuel power based grid shall form the baseline to the project activity which has been developed in Section B.4 of this document. Further to this, a detailed monitoring procedure is provided in Section B.7 of this document.

A.4. Parties and project participants

Party involved (host) indicates host Party	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
India (Host)	Serum Institute of India Limited – Private Entity	No

A.5. Public funding of project activity

No public funding has been used in this project activity.

SECTION B. Application of selected approved baseline and monitoring methodology and standardized baseline

B.1. Reference of methodology and standardized baseline

Title: Consolidated baseline methodology for grid-connected electricity generation from renewable sources
Reference: ACM0002, Version 12.3.0, EB 66

The methodology also refers to the latest approved versions of:
“Tool to calculate the emission factor for an electricity system”, Version 02.2.1, EB 63

"Tool for the demonstration and assessment of additionality", Version 06, EB 65

B.2. Applicability of methodology and standardized baseline

The adopted baseline methodology has been chosen for the project activity based on the fulfilment of the applicability conditions as described below:

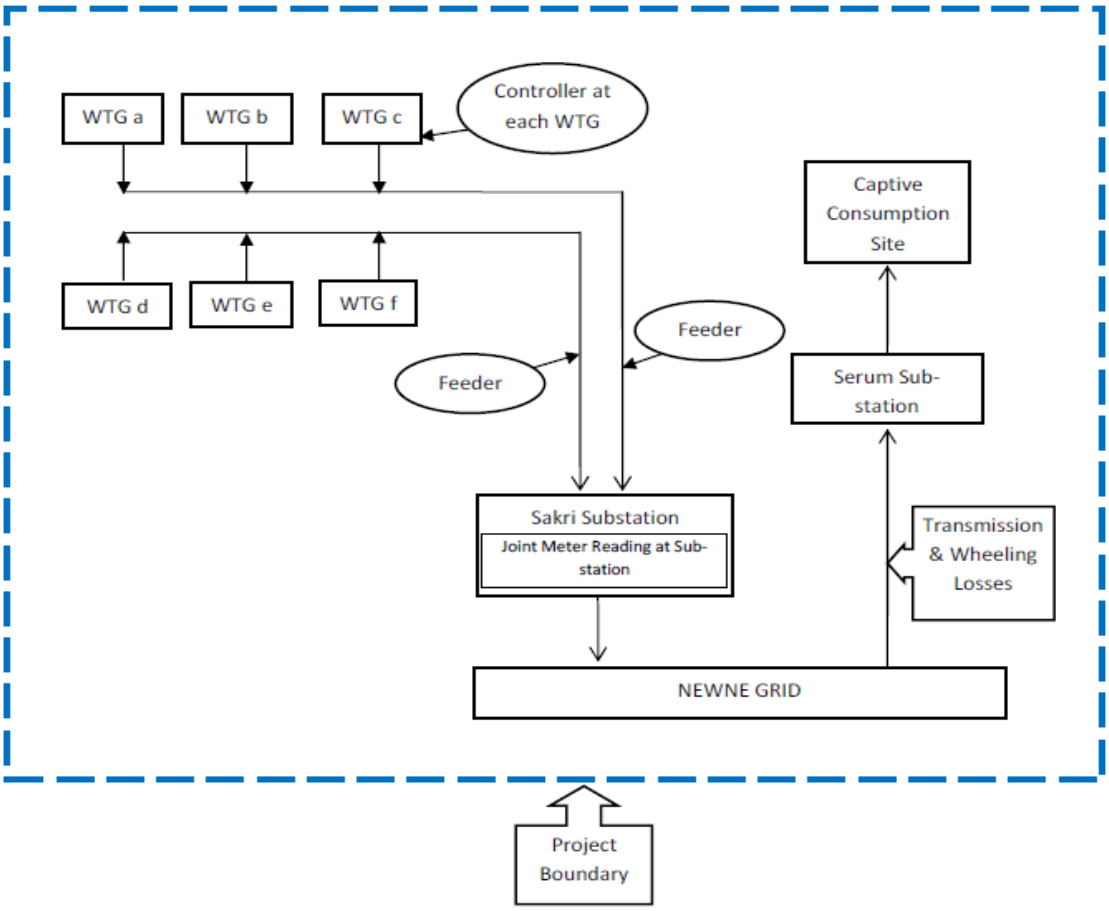
Sr. No.	Applicability Conditions as per ACM0002	Applicability to this Project Activity
1	This methodology is applicable to grid-connected renewable power generation project activities that (a) install a new power plant at a site where no renewable power plant was operated prior to the implementation of the project activity (greenfield plant); (b) involve a capacity addition; (c) involve a retrofit of (an) existing plant(s); or (d) involve a replacement of (an) existing plant(s).	The project activity involves the installation of a new wind energy based power plant in Maharashtra of 33.6 MW capacity and no renewable power plant was operated prior to the implementation of the project activity (greenfield plant). Hence, this applicability condition is met.
2	The project activity is the installation, capacity addition, retrofit or replacement of a power plant/unit of one of the following types: hydro power plant/unit (either with a run-of-river reservoir or an accumulation reservoir), wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit	The project activity is the installation of 33.6 MW wind energy based power plant in Maharashtra. Hence, this applicability condition is met.
3	In the case of capacity additions, retrofits or replacements(except for capacity addition projects for which the electricity generation of the existing power plant(s) or unit(s) is not affected : the existing plant started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity addition or retrofit of the plant has been undertaken between the start of this minimum historical reference period and the implementation of the project activity	The project activity is a Greenfield setup and does not involve capacity additions, retrofits or replacements. Hence, this criterion is not applicable.
4	In case of hydro power plants, at least one of the following conditions must apply: • The project activity is implemented in an existing single or multiple reservoirs, with no change in the volume of any of the reservoirs; • The project activity is implemented in an existing single or multiple reservoirs, where the volume of any of the reservoir is increased and the power density of each of reservoir, as per definitions given in the Project Emissions section, is greater than 4 W/m^2 after the implementation of the project activity; • The project activity results in a single or multiple new reservoirs and the power density of each reservoir, as per definitions given in the Project Emissions section, is greater than 4 W/m^2 after the implementation of the project activity.	The project activity is not a hydropower project. Hence, this applicability criterion is not relevant to the project activity.
5	In case of hydro power plants using multiple reservoirs	This is not a hydro power plant.

	where the power density of any of the reservoirs is lower than 4W/m^2 after the implementation of the project activity all of the following conditions must apply: • The power density calculated for the entire project activity using equation 5 is greater than 4 W/m^2; • All reservoirs and hydro power plants are located at the same river and where are designed together to function as an integrated project that collectively constitutes the generation capacity of the combined power plant; • The water flow between the multiple reservoirs is not used by any other hydropower unit which is not a part of the project activity; • The total installed capacity of the power units, which are driven using water from the reservoirs with a power density lower than 4 W/m^2, is lower than 15MW; • The total installed capacity of the power units, which are driven using water from reservoirs with power density lower than 4 W/m^2, is less than 10% of the total installed capacity of the project activity from multiple reservoirs.	Hence, this applicability criterion is irrelevant.
6	This methodology is not applicable for project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be continued use of fossil fuels at the site	The wind-mills are being newly installed at the project sites There is no fuel-switch from fossil fuel to renewable energy source in the proposed project activity. Hence, this criterion is not applicable.
7	This methodology is not applicable for Biomass fired power plants	The project activity does not use Biomass fired power plant. Hence, this condition is not relevant to the proposed wind project activity.
8	This methodology is not applicable for Hydro power plants that result in new reservoirs or in the increase in existing reservoirs where the power density of the reservoir is less than 4 W/m^2	The project activity is not a hydro power project. Hence, this applicability criterion is not relevant to the project activity.
9	In the case of retrofits, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is the continuation of the current situation, i.e. to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance	The project activity is a Greenfield setup and does not involve capacity additions, retrofits or replacements. Hence, this criterion is not applicable

B.3. Project boundary

As per the **Approved consolidated baseline and monitoring methodology ACM0002**, the project boundary is "The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the CDM project power plant is connected to."

The project boundary includes the electricity generation equipment at the site and the transport through the grid to the consumption site/grid. Hence, project boundary is considered within these terminal points. The project boundary, as per monitoring layouts involving the project activity, is portrayed as follows:



As per the approved methodology, ACM0002, Version 12.3.0, following gases and emission sources has been included in the project boundary.

Source		GHGs	Included?	Justification/Explanation
Baseline scenario	CO2 emissions from electricity generation in fossil fuel fired power plants that is displaced due to the project activity	CO_2	Yes	Main emission source
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source
Project scenario	For geothermal power plants, fugitive emissions of CH4 and CO2 from non-condensable gases contained in geothermal steam.	CO_2	No	The present project activity is a greenfield wind power project. Hence, not relevant
		CH_4	No	
		N_2O	No	
	CO2 emissions from	CO_2	No	The present project activity is a

	combustion of fossil fuels for electricity generation in solar thermal power plants and geothermal power plants	CH_4	No	greenfield wind power project. Hence, not relevant
		N_2O	No	
	For hydro power plants, emissions of CH4 from the reservoir.	CO_2	No	The present project activity is a greenfield wind power project. Hence, not relevant
		CH_4	No	
		N_2O	No	

B.4. Establishment and description of baseline scenario

Identification of the baseline scenario

The project activity is the installation of a new wind power plant. This project is not a modification/retrofit of any existing electricity generation facility. Hence, in accordance to the approved methodologyACM0002, Version 12.3.0, the baseline scenario for new installation facility is described as:

"*Electricity delivered to the grid by the project would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system*."

Determination of emission factor figures have been calculated and provided in section B.6.1 of this PDD.

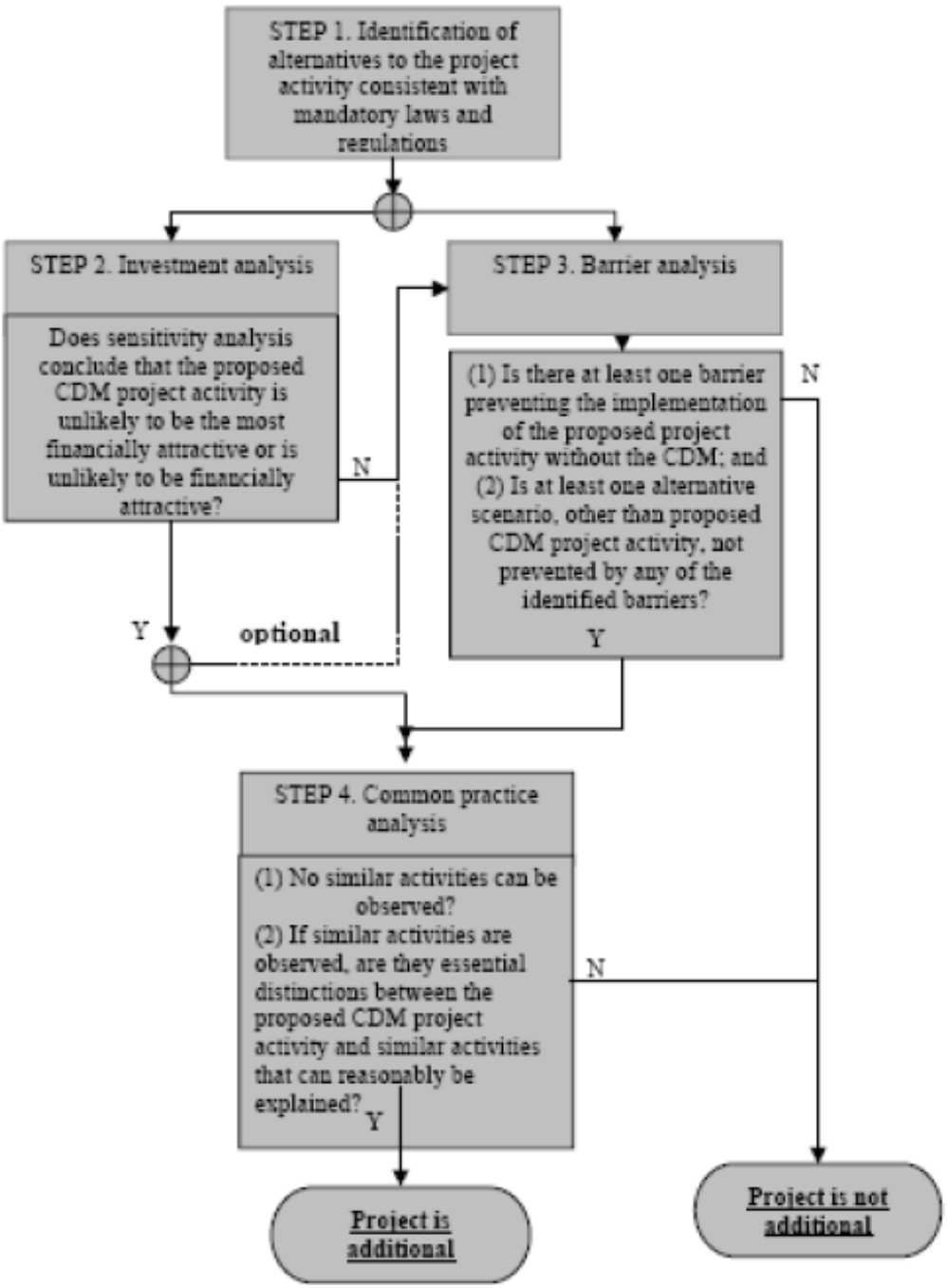
B.5. Demonstration of additionality

The table below is only applicable if the proposed project activity is a type of project activity which is deemed automatically additional, as defined by the applied approved methodology or standardized baseline.

Specify the methodology or standardized baseline that establish automatic additionality for the proposed project activity (including the version number and the specific paragraph, if applicable).	Not Applicable
Describe how the proposed project activity meets the criteria for automatic additionality in the relevant methodology or standardized baselines.	Not Applicable

The project activity has been conceived as a CDM project since its inception. SIIL has taken CDM revenue right from the onset of this wind project. The evidence of the same can be verified by the Designated Operational Entity (DOE) at the time of project validation.

The additionality of the proposed project activity has been demonstrated below in accordance with the "Tool for the demonstration and assessment of additionality, Version 6 and as described in the following flow chart. This is followed by the descriptions of baseline and project scenarios and how emission reductions would occur in the project activity. The steps as per the additionality tool are provided in the figure below:



Steps	Additionality Requirements	Status of Additionality Check
1. Identification of alternatives to the project activity consistent with mandatory laws and regulations		
Sub-step 1(a): Define alternatives to the project activity Sub-step 1(b): Consistency	SIIL has set up a 33.6 MW wind power project in order to generate electricity and utilize it for captive purposes, sale to third party or to the grid. As per approved methodology ACM 0002 Version 12.3.0: "*If the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline*	The additionality check has crossed Step 1 and may proceed to Step 2 (Investment Analysis) followed by Step 3 (Barrier

with mandatory laws and regulations	*scenario is the following:* *Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system".*" Further, the project activity conforms to all the applicable laws and regulations in India: Power generation using wind energy is not a legal requirement or a mandatory option. There are state and sectoral policies, framed primarily to encourage wind power projects. These policies have also been drafted realizing the extent of risks involved in the projects and to attract private investments. The Indian Electricity Act, 2003 (May 2007 Amendment) does not influence the choice of fuel used for power generation. There is no legal requirement on the choice of a particular technology for power generation.	Analysis) and Step 4 (Common Practice Analysis). In the project case, Step 2 has been used for additionality check, followed by Step 3 and 4.
Step 2: Investment Analysis		
Step 2 (a): Determine appropriate analysis method	The project proponent proposes to save revenue by generating electricity that would have otherwise been supplied by the state electricity board. Hence a simple cost analysis is not applicable in the present situation. Amongst the other two options, Investment Comparison Option and Benchmark analysis, the benchmark analysis has been adopted. Here, the Internal Rate of Return (IRR) on the equity for the project activity serves as a benchmark to assess the financial attractiveness of the project activity.	The additionality check has crossed Step 2(a). and can proceed to Step 2(b)
Step 2(b): Option III: Apply benchmark analysis	This is the first project activity being undertaken by SIIL with the motive of utilizing the wind power produced for captive purpose, sale to third party or to the grid. Initially, it was decided that 18 WTGs of 2.1 MW each would be set up as part of this project activity. An agreement for the same was also entered into; however, during project implementation, only 16 WTGs will be commissioned. At the time of investment decision, there was no precedence of an investment made by SIIL in renewable energy based power generation. Further, since the project involved 100% equity, SIIL consecutively sought an equity returns based benchmark applicable to independent power producers in the country implementing similar projects. An investment analysis of the project activity was conducted with equity Internal Rate of Return (IRR) as the financial indicator. IRR is one of the known financial indicators used by banks, lending institutions and project developers for decision making. The benchmark IRR for the project has been chosen as 19.75%. The value has been arrived at following the Capital Asset Pricing	

Model.

$R_i = R_f + \beta * (R_m - R_f)$
where,

R_i	Market based returns on equity
R_f	Risk-free Return at the time of decision making
β	Average of Beta value among 9 power sector companies for 3 year period from 01/04/2007 - 31/03/2010
R_m	Risk Premium

For the present project activity, the Reserve Bank of India's Yield to Maturity rate has been adopted as the risk-free rate of return which stood at 8.2672 % at the time of decision making[1].

The Beta value has been conservatively taken to be the average of the 3 year beta values of the following companies which are listed on the BSE-500:

1. CESC Ltd.
2. Gujarat Industries Power Co. Ltd.
3. KSK Energy Ventures Ltd.
4. Neyveli Lignite Corpn.
5. BF Utilities
6. Reliance Infrastructure Ltd.
7. Tata Power Co. Ltd.
8. Torrent Power Ltd.
9. NTPC

The average Beta value for this period is 1.0801

The risk premium value has been arrived at by calculating the Compound Annual Growth Rate for the BSE-500 since its base year (1999) on a base value of 1000. At the time of decision making, the BSE-500 had a low of 6906.52. Hence, the risk premium value is

= Rm = {(6906.52/1000)^(1/11.16) – 1} = 18.90%
wherein, 11.16 years has been the gap between the base year and date of decision making.

Hence, Ri = 8.2672 + 1.0801 * (18.90 – 8.2672) = 19.75%

Step 2 (c): Calculation and comparison of financial indicators

The following assumptions have been made for conducting the financial analysis:
(Note: 1 Lakh INR= 100,000 INR)

Capacity of the wind project	37.8 MW	Quotes provided by WTG provider
No. and capacity of machines	18 Nos. X 2.1 MW	Quotes provided by WTG provider
Net Annual	36 Lakh	Quotes provided

[1] http://www.rbi.org.in/scripts/BS_ViewBulletin.aspx?Id=11067

Generation	kWh/WTG	by WTG provider
Transmission Losses	4.85%	MERC Order
Wheeling Losses	6%	MERC Order
Net Annual Consumption incl. of above loss factors	32.198 Lakh kWh/WTG	Calculated
Annual O&M Costs	INR 21 Lakh/WTG	Quotes provided by WTG provider
% Escalation in O&M charges p.a.	5%	Quotes provided by WTG provider
Estimated Savings per unit	INR 5.39/kWh	Calculated
Tax holiday u/s 80IA available up to	15 years	Income Tax Law
Total Project Cost	INR 21600 Lakh	Calculated as per the Supplier' Quotation
Residual Value	10% of WTG cost	Assumed
Salvage value	Residual value + land cost	Calculated
Funding	Equity 100 % Debt 0 %	
Book Depreciation Rate	5.28%	Companies Act
IT Depreciation Rate	80%	IT Act
CER Price	12 €/tCo2e	Assumed
Exchange Rate for Euros	61.47 INR/€	As on 21/03/2010 @ oanda.com
Corporate Tax Rate	33.22%	IT Act (FY 010-11)

The Equity IRR works out to 10.71% % keeping the above data in consideration without CDM Revenues.

Change in Project Design:

During the project life based on the changes in the regulatory guidelines the PP has entered into Third party contract as well as supplied electricity to the Grid, apart from captive use. This change leads to change in the project design and accordingly change IRR has been assessed below.

There are 4 possible scenario for the PP to offload

power generated by the wind mills:
1. Captive use: The captive price per unit is based on the HT tariff[2] applicable for the captive period i.e. INR 7.01/kWh
2. Sale to Grid: The tariff for sale to grid for 15 WTGs is INR 2.86 and INR 3.04 for 1 WTG based on the MERC tariff order.
3. Sale to Third party: The price calculations are submitted to the DOE the average price is always sold at a discount to the HT tariff applicable. Currently the HT tariff is INR 7.01.
4. Sale through power exchange: The Average price for trading through power exchange is INR 3.27 from 2011 to 2015 calender years as available on IEX India website[3].

The HT tariff applicable at the time of decision making was 5.39, which was revised to INR 7.01 over a period of time. Thus even if we apply the price of INR 7.01 (maximum price) for the entire project life the IRR comes to 16.69% which is lower than the benchmark of 19.75%.

The IRR values for the above 4 scenarios are as follows;

Scenario	Tariff (INR/kWh)	Losses Applied*	IRR (%)
Captive use	7.01	6% + 4.85%	16.69%
Sale to Grid	2.87 **	0%	1.28%
Sale to Third party	7.01 #	6% + 4.85%	16.69%
Sale through power exchange	3.27 ##	0%	3.31%

* Losses include Wheeling and Transmission loss
** Weighted average Tariff based on INR 2.86 per kWh for 15 WTG and INR 3.04 per kWh for 1 WTG.
# This is the applicable HT tariff thus maximum value that can be received by the PP for sale to third party.
This is an average historical price as mentioned on the IEX website, the applicable charges are not considered to ensure conservative calculations.

Thus the additionality is not impacted by the Design changes made for the project activity.

Step 2 (d): Sensitivity Analysis

The project activity has been found sensitive to the following parameters for which the equity IRR without CDM revenues have been calculated:

Parameter Varied for IRR w/o CDM	**Sensitivity**	
	10%	**-10%**

[2] http://www.mahadiscom.in/tariff/Final-Order-CaseNo19-2012.pdf

[3] http://www.iexindia.com/marketdata/areaprice.aspx

Generation	12.67%	8.71%	
O&M	10.44%	10.97%	
Tariff	12.69%	8.69%	
Capital Cost	9.19%	12.50%	

The purpose of the sensitivity analysis is to demonstrate the sensitivity of the return on project due to uncertainty in the plant load factor and project costs as well as the uncertainty in the charges of the power which would have otherwise been sourced from the grid. Even though the power tariff has been calculated on a weighted average basis utilizing previous three years power cost data, the robustness of the investment analysis was further demonstrated by using an escalation margin of 3.06% which has been calculated as the Compounded Average Growth Rate (CAGR) of power tariff applicable to the project proponent over a period of the past five years3. Even so, the equity IRR does not cross the benchmark. Also, including a sensitivity of 10% on this escalated tariff does not make the equity IRR to cross the benchmark and the candidate project activity retains its additionality.
As can be seen from the above analysis there is significant risk associated with the project activity that impacts the viability of the project activity.

Thus the project activity is not the most financially attractive option.

Step 4: Common Practice Analysis

a) Analyze other activities similar to proposed project activity

As per the approved methodological tool, common practice analysis includes:

"Projects are considered similar if they are in the same country/region and/or rely on a broadly similar technology, are of a similar scale, and take place in a comparable environment with respect to regulatory framework, investment climate, access to technology, access to financing, etc. Other CDM project activities (registered project activities and project activities which have been published on the UNFCCC website for global stakeholder consultation as part of the validation process) are not to be included in this analysis"

In the context of the present project activity, the following parameters are defined in line with paragraphs 5 – 10 of this approved methodological tool:

Measure: As per paragraph 6, the project activity falls under the following measure:
"(b) Switch of technology with or without change of energy source (including energy efficiency improvement as well as use of renewable energies);"

Output: As per paragraph 7, "power generation" may be considered to be the output in the context of the project activity. Further as per Step 1 of paragraph 47 of the same tool, the applicable output range will be 18.9MW to

	56.7 MW, i.e. ±50% of installed capacity of the project activity (37.8 MW) ***Different technologies*** in the context of the project activity: a) Energy source/fuel: In this case, the source of energy is wind power b) Feed Stock: This criterion is irrelevant in the context of the project activity as no feed stock is involved c) Size of installation: Since the installed capacity of the project activity is higher than 15 MW, the installation size shall be considered as "Large" d) Investment climate: i. Access to technology: Access to the wind power generation technology is fairly same across the host country ii. Subsidies or other financial cash flows: Though not applicable in the case of wind power, subsidies are regulated by the Ministry of New & Renewable Energy, India for the entire host country iii. Promotional policies: Though not applicable in the case of wind power, subsidies are regulated by the Ministry of New & Renewable Energy, India for the entire host country iv. Legal regulation: As per the Electricity Act 2003, the state electricity regulatory commissions are responsible for formulating legislations for various renewable energy power projects coming up in the respective state. In light of this, it may be appropriate to consider the pre-2003 era of the Indian power sector as a different investment climate altogether. Since such regulations vary from state-to-state, the same renewable energy power project will be subjected to different regulations depending upon its location. Hence, in this case, project activities with similar legal regulation are those commissioned post- 2003 in the state of Maharashtra. e) Other features: No additional aspects of variance are observed for similar project activities ***Applicable geographical area***: As per paragraph 5, the host country is to be considered as the default geographical area. Thus, as per paragraph 47 of the methodological tool, *Step 1: Calculate applicable output range as +/-50% of the design output or capacity of the proposed project activity* The applicable output range is 18.9 MW to 56.7 MW (i.e. +/- 50% of 37.8MW). *Step 2: In the applicable geographical area, identify all plants that deliver the same output or capacity, within the*	

applicable output range calculated in Step 1, as the proposed project activity and have started commercial operation before the start date of the project. Note their number Nall. Registered CDM project activities shall not be included in this step

In this step, all the plants in India delivering power in the applicable output range of 18.9 MW to 37.8 MW have been considered. Further, all the CDM registered project activities and project activities undergoing validation have been excluded.

Technologies	**Total number of projects in the capacity range**	**N_{all}**
Hydroelectric	44	44
Thermal	8	8
Nuclear	0	0
Wind	54	18
Biomass & Bagasse	84	71
Total (N_{all})		141

Step 3: Within plants identified in Step 2, identify those that apply technologies different that the technology applied in the proposed project activity. Note their number N_{diff}.

In this step, those project activities that apply technologies different from that of the project activity (as defined above "Different technologies") have been identified.

Technologies	**N_{diff}**
Hydroelectric	44
Thermal	8
Nuclear	0
Wind	17
Biomass & Bagasse	71
Total (N_{diff}	140

Step 4: Calculate factor $F=1-N_{diff}/N_{all}$ representing the share of plants using technology similar to the technology used in the proposed project activity in all plants that deliver the same output or capacity as the proposed project activity

In this step, the factor F is evaluated as below:
$F = 1 – (N_{diff}/N_{all}) = 1- (140/141) = 0.0071$

Also, $N_{all} – N_{diff} = 141-140 = 1$

Thus, the results of the analysis are as follows:
a) $F < 0.2$
b) $N_{all} – N_{diff} =1$

Since both the conditions of paragraph 47 of the

	approved methodological tool are not fulfilled, the present project activity is not a "common practice" within a sector in the applicable geographical area.	
Step 4b: Discuss any similar options that are occurring:	Thus, it is observed that all similar projects activities have applied for CDM revenues. Also, it is evident that large scale wind projects are not a common practice in the region. In view of this, the project activity is not a common practice project, the project is additional and not the same as baseline scenario and would not have occurred without the CDM. The approval and registration of the proposed project activity as a CDM project would lead to additional revenue thereby improving the returns from the project activity alleviating investment and regulatory policy risk. The successful registration also provides an incentive for other proponents to invest in wind power projects. Thus the CDM revenue acts as a risk mitigation tool in overcoming barriers.	

A brief chronological sequence of the project activity is as follows:

Sl. No.	Event	Date
1.	Board Approval for project	06/04/2010
2.	Intimation to UNFCCC & DNA (MoEF)	01/07/2010
3.	Signing Supply Agreement	05/08/2010
4.	Stakeholders' Consultation	26/10/2010
5.	Appointment of DOE	24/03/2011
6.	All mandatory clearances	16/03/2011
7.	Commissioning	06/09/2011

B.6. Emission reductions

B.6.1. Explanation of methodological choices

Baseline Emissions:
Baseline Emissions Calculations:

The baseline emissions are to be calculated using the following formula
Baseline Emissions = $EF_{Grid,CM,y}$ x $EG_{PJ,y}$

Where,
$EG_{PJ,y}$: $EG_{Facility,y}$, quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh)

Method of calculation of combined margin emission factor: "*Tool to calculate the emission factor for an electricity system", Version 2.2.1, EB 63 (Annex 19: Methodological Tool).*

The combined margin calculations estimate the baseline emission factor for grid. It consists of a combination of operation margin (OM) and build margin (BM) factors obtained from publication issued by Central Electricity Authority (CEA) of India- CO2 Baseline Database for the Indian Power Sector, Version 06, dated March 1, 2011.

Calculation of the Baseline Emission Factor

Step 1: Identify the relevant electricity systems

A “project electricity system” is defined by the spatial extent of the power plants that are physically connected through transmission and distribution lines to the project activity and that can be dispatched without significant transmission constraints.

A “connected electricity system” is defined as an electricity system that is connected by transmission lines to the project electricity system. Power plants within the connected electricity system can be dispatched without significant transmission constraints but transmission to the project electricity system has significant transmission constraint. The tool requires the following considerations while determining whether significant transmission constraints exist or not:

- In case of electricity systems with spot markets for electricity: there are differences in electricity prices (without transmission and distribution costs) of more than 5% between the systems during 60%or more of the hours of the year.
- The transmission line is operated at 90% or more of its rated capacity during 90% percent or more of the hours of the year.

In the Indian context, as no well-established spot markets exist, the first criterion is not applicable. Similarly, a transmission line fulfilling the second criteria is an exception in Indian Context. Hence the use of these criteria does not result in a clear grid boundary. In such a scenario, the use of a regional grid definition in case of large countries with layered dispatch systems (e.g. provincial, regional/national) is recommended. Further, it states that a provincial grid definition may in many cases be too narrow given significant electricity trade among provinces that might be affected, directly or indirectly, by a CDM project activity.

Of the two regional grids of the Indian Electricity system, the NEWNE grid covers the state of Maharashtra wherein the present project activity is located.

Each state in a regional grid meets its own demand with its own generation facilities and also with allocation from power plants owned by the central sector. Depending on the demand and generation, there are electricity exports and imports between states in the regional grid. The volume of the net transfers between the regions in India is relatively small and electricity is largely produced and consumed within the same states. Consequently, it is appropriate to assume that the impacts of the project activity will be confined to the regional grid in which it is located. Hence for the purpose of estimation of the baseline emission factor, the NEWNE grid has been chosen as the relevant electricity system.

Step 2: Choose whether to include off-grid power plants in the project electricity system (optional)

The project proponent wishes to include only grid power plants in the calculation, while off-grid plants will be excluded.

Step 3: Select a method to determine the Operating Margin (OM)

The calculation of the operating margin emission factor ($EF_{grid,OM,y}$) is based on one of the following methods, which are described under Step 4:

a) Simple OM; or
b) Simple adjusted OM; or
c) Dispatch data analysis OM; or
d) Average OM.

The simple OM method (Option a) can only be used if low-cost/must-run resources constitute less than50% of total grid generation in: 1) average of the five most recent years, or 2) based on long-term averages for hydroelectricity production. The dispatch data analysis (Option c) cannot be used if off-grid power plants are included in the project electricity system as per Step 2 above.

The project proponent wishes to use the Simple Operating Margin (OM) method for the estimation of the Operating Margin Emission Factor. The use of the Simple OM method is justified as the share of the low cost/ must run resources constitute less than 50% of the total grid generation. The data pertaining to the total grid generation and the low/cost must run resources have been included in Annex 3. The Ex ante option has been chosen where in a three year generation weighted average based on the most recent data available has been calculated ex ante and would be fixed for the crediting period. Hence, the parameters for the calculation of OM do not need to be monitored and the OM does not need to be calculated during the crediting period of ten years.

Step 4: Calculate the Operating Margin Emission Factor according to the selected method

The simple OM method is selected. The simple OM may be calculated by one of the following two options:

Option A: Based on the net electricity generation and a CO2 emission factor of each power unit; or
Option B: Based on the total net electricity generation of all power plants serving the system and the fuel types and total fuel consumption of the project electricity system.

Option B can only be used if:

a) The necessary data for Option A is not available; and
b) Only nuclear and renewable power generation are considered as low-cost/must-run power sources and the quantity of electricity supplied to the grid by these sources is known; and
c) Off-grid power plants are not included in the calculation (i.e. if Option I has been chosen in Step 2).

The simple OM emission factor is calculated as the generation-weighted average CO2 emissions per unit net electricity generation (tCO2/MWh) of all generating power plants serving the system, not including glow-cost / must-run power plants / units.

The data provided by the CEA, an official data source has been relied upon for the calculation of the OM. The same has been detailed in Appendix 3. CEA database, Version 6 that was current at the time of commencement of validation has been used. The OM calculations have been based upon net electricity generation and fuel consumption of each power plant.

Assumptions:

The following assumptions have been made in case of unavailability of data at station level:

- Net generation: In case of stations where only gross generation is available, CEA standard values for auxiliary consumption have been applied to calculate the net generation data.
- GCV: Default GCV values for some thermal power stations have been used for cases where station specific data was unavailable.

The following assumptions have been in case of unavailability of data at unit level:

Net generation: The data is not monitored at a unit level and hence the following assumptions have been made

1. The auxiliary consumption (in % of gross generation) of the unit was assumed to be equal to that of the respective stations in the following cases:
   a) All units of a station fall into the build margin; or
   b) All units of a station have the same installed capacity; or
   c) The units in the station have different capacities but do not differ with respect the applicable standard auxiliary consumption.
2. In all other cases, standard values for auxiliary consumption adopted by CEA were applied.
3. Fuel consumption and GCV: Fuel consumption and GCV are generally not measured at unit level. Instead, the specific CO2 emissions of the relevant units were directly calculated based on heat rates.

Calculation Approach: The Simple OM has been calculated using the following formula:

$$EF_{grid,OM,simple,y} = \frac{\sum_{i,m} EG_{i,m,y} \times EF_{EL\,m,y}}{\sum_{m} EG_{m,y}}$$

Where:
$EG_{ELm,y}$ = Net CO2 emission factor of power unit m in year y (tCO2/MWh)
$EG_{m,y}$ = Net electricity generated and delivered to the grid by power plant / unit m in year y (MWh)
$EF_{grid,OM,simple,y}$ = Simple operating margin CO2 emission factor in year y (tCO2/MWh)

And,

$$EF_{EL,m,y} = \frac{\sum_{i,m} FC_{i,m,y} \times NCV_{i,y} \times EF_{CO2,i,y}}{\sum_{m} EG_{m,y}}$$

Where:
$EG_{ELm,y}$ = Net CO2 emission factor of power unit m in year y (tCO2/MWh)
$FC_{i,m,y}$ = Amount of fossil fuel type "i" consumed by power plant / unit m in year y (mass or volume unit)
$NCV_{i,y}$ = Net calorific value (energy content) of fossil fuel type i in year y (GJ / mass or volume unit)
$EF_{CO2,i,y}$ = CO2 emission factor of fossil fuel type i in year y (tCO2/GJ)
$EG_{m,y}$ = Net electricity generated and delivered to the grid by power plant / unit m in year y (MWh)
m = All power plants / units serving the grid in year y except low-cost / must-run power plants / units
i = All fossil fuel types combusted in power plant / unit m in year y
y = The three most recent years for which data is available at the time of submission of the PDD to the DOE for validation (for ex ante option)

The three most recent years for which data was available at the time of submission to the DOE included2007-08, 2008-09 and 2009-10 and the same is presented in Annex 3 of the PDD. The generation weighted average value for these three years works out to 0.9942.

Thus, $EF_{Grid,OM,y}$ = 0.9942 tCO2/MWh

Step 5: Calculate the build margin (BM) emission factor

With regards to data vintage, the project participant wishes to use Option 1 viz., for the crediting period, calculate the build margin emission factor ex-ante based on the most recent information available on units already built for sample group "m" at the time of CDM-PDD submission to the DOE for validation.

The sample group of power units m used to calculate the build margin has been determined as per the following procedure, consistent with the data vintage selected above:

a) The set of five power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently ($SET_{5\text{-units}}$) was identified and their annual electricity generation ($AEG_{SET\text{-}5\text{-}units}$, in MWh) was determined;
b) The annual electricity generation of the project electricity system, excluding power units registered as CDM project activities (AEG_{total}, in MWh) was determined. The set of power units, excluding power units registered as CDM project activities, that started to supply electricity to the grid most recently and that comprise 20% of AEG_{total} (if 20% falls on part of the generation of a unit, the generation of that unit is fully included in the calculation) ($SET_{\geq 20\%}$) was identified and their annual electricity generation ($AEG_{SET\text{-}\geq 20\%}$, in MWh) was determined;
c) From $SET_{5\text{-units}}$ and $SET_{\geq 20\%}$ the set of power units that comprises the larger annual electricity generation (SET_{sample}) was selected;

Since none of the power units in SET_{sample} started to supply electricity to the grid more than 10 years ago, this set SET_{sample} has been used to calculate the build margin.

The data pertaining to the units thus identified are detailed in the Version 6 of the Baseline Carbon Dioxide Emissions database of the CEA.

The sample group of power units "m" selected for calculation of the build margin consists of the set of power capacity additions in the electricity system that comprise 20% of the system generation (in MWh)and that have been built most recently. The data pertaining to the units thus identified are detailed in the Version 6 of the Baseline Carbon Dioxide Emissions database of the CEA.

With regards to data vintage, the project participant wishes to use Option 1 viz., for the crediting period, calculate the build margin emission factor ex-ante based on the most recent information available on units already built for sample group "m" at the time of CDM-PDD submission to the DOE for validation.

The build margin emissions factor is the generation-weighted average emission factor (tCO2/MWh) of all power units m during the most recent year y for which power generation data is available and will be calculated as follows:

$$EF_{grid,BM,y} = \frac{\sum_{m} EG_{m,y} \times EF_{EL,m,y}}{\sum_{m} EG_{m,y}}$$

Where:
$EF_{grid,BM,y}$ = Build margin CO2 emission factor in year y (tCO2/MWh)
$EG_{m,y}$ = Net quantity of electricity generated and delivered to the grid by power unit m in year y (MWh)
$EF_{EL,m,y}$ = CO2 emission factor of power unit m in year y (tCO2/MWh)
m = Power units included in the build margin
y = Most recent historical year for which power generation data is available

The Build Margin has been calculated ex ante during the crediting period. For ex ante calculation the most recent data available has been used and the build margin thus calculated is 0.8123.

Therefore, $EF_{Grid,BM,y}$ = 0.8123 tCO2/MWh

Step 6: Calculate of the Combined Margin (CM) Emission Factor

The combined margin emission factor is calculated as follows:
$EF_{grid,CM,y} = EF_{grid,OM,y} * W_{OM} + EF_{grid,BM,y} * W_{BM}$

Where,
$EF_{grid,BM,y}$ = Build margin CO2 emission factor in year y (tCO2/MWh)
$EF_{grid,OM,y}$ = Operating margin CO2 emission factor in year y (tCO2/MWh)
W_{OM} = Weighting of operating margin emissions factor (%)
W_{BM} = Weighting of build margin emissions factor (%)

The default values to be used for Wind Power projects are
W_{OM}= 0.75 W_{BM}= 0.25

Hence, the Baseline Emission Factor is calculated as below:

$EF_{Grid,CM,y} = W_{OM} * EF_{Grid,OM,y} + W_{BM} * EF_{Grid,BM,y}$
= 0.75 * 0.9942+ 0.25 * 0.8123
= 0.9487 tCO2/MWh

The Baseline Factor thus calculated is fixed during the crediting period.

The net export expected from the project activity is on an annual basis is 55,759 MWh. Hence the baseline emissions are calculated as below:

Baseline Emissions = 0.9487 x 55,759
= 52,898 tCO2

Project Emission Calculations:
As per the applicable methodology ACM0002, Version 12.3.0, $PE_y = 0$
Hence, for the project activity, $PE_y = 0$.

Leakage Emission Calculation:
As per the applicable methodology ACM0002, Version 12.3.0, no leakage emissions are considered.

Emission Reduction Calculation:
$ER_y = BE_y – PE_y = (EG_{facility,y} \times EF_{Grid,CM,y}) – PE_y$
$ER_y = (0.9487 \times 55,759 – 0$
= 52,898 tCO2e

Based on the methodology and formulas detailed in the above section, the Carbon Emission Reductions have been calculated.

B.6.2. Data and parameters fixed ex ante

Data / Parameter	$EF_{grid,CM,y}$
Unit	tCO2/MWh
Description	Combined margin CO2 emission factor for the project electricity system (NEWNE regional grid) for the year y
Source of data	CEA, CO2 Baseline Emission Factor for Indian Power Sector, Version 06(Valid from 1st March 2011)
Value(s) applied	0.9487
Choice of data or Measurement methods and procedures	The value applied is taken from the plant from CEA reviews. The weights used for calculating combined margin emission factor are 0.75 and 0.25 for operating margin and build margin respectively.
Purpose of data	Calculation of baseline emission
Additional comment	Calculated ex-ante, data will be kept for crediting year +2 years

Data / Parameter	$EF_{grid,OM,y}$
Unit	tCO2/MWh
Description	Operating margin CO2 emission factor for the project electricity system (NEWNE regional grid) for the year y
Source of data	CEA, CO2 Baseline Emission Factor for Indian Power Sector, Version 06 (Valid from 1st March 2011)
Value(s) applied	0.9942

Choice of data or Measurement methods and procedures	Obtained from the CEA database on CO2 Baseline for Indian Power Sector, Version 06 as the weighted average of Operating Margin (incl. imports) for years 2007-08, 2008-09 and 2009-10
Purpose of data	Calculation of baseline emission
Additional comment	Calculated ex-ante, data will be kept for crediting year +2 years

Data / Parameter	$EF_{grid,BM,y}$
Unit	tCO2/MWh
Description	Build margin CO2 emission factor for the project electricity system (NEWNE regional grid) for the year y
Source of data	CEA, CO2 Baseline Emission Factor for Indian Power Sector, Version 06 (Valid from 1st March 2011)
Value(s) applied	0.8123
Choice of data or Measurement methods and procedures	Obtained from the CEA database on CO2 Baseline for Indian Power Sector, Version 06 (not adjusted for imports)
Purpose of data	Calculation of baseline emission
Additional comment	Calculated ex-ante, data will be kept for crediting year +2 years

B.6.3. Ex ante calculation of emission reductions

Project: 16 Nos. of 2.1 MW
Net annual Generation Capacity of Project Activity supplied to grid = 55,759 MWh
Combined Emission Factor of CO2 for the project electricity system (NEWNE Region Grid)
= 0.9487 tCO2/MWh
Baseline Emissions = 55,759 MWh x 0.9487 tCO2/MWh = 52,898 tCO2
Project Emissions = 0 tCO2
Emission Reductions = Baseline Emissions – Project Emissions
= 52,898– 0 = **52,898 tCO2/year**

B.6.4. Summary of ex ante estimates of emission reductions

Year	Baseline emissions (t CO_2e)	Project emissions (t CO_2e)	Leakage (t CO_2e)	Emission reductions (t CO_2e)
Year 1: June 2012- May 2013	0	52,898	0	52,898
Year 2: June 2013- May 2014	0	52,898	0	52,898
Year 3: June 2014- May 2015	0	52,898	0	52,898
Year 4: June 2015- May 2016	0	52,898	0	52,898
Year 5: June 2016- May 2017	0	52,898	0	52,898
Year 6: June 2017- May 2018	0	52,898	0	52,898

Year 7: June 2018- May 2019	0	52,898	0	52,898
Year 8: June 2019- May 2020	0	52,898	0	52,898
Year 9: June 2020- May 2021	0	52,898	0	52,898
Year 10: June 2021- May 2022	0	52,898	0	52,898
Total	0	528,980	0	528,980
Total number of crediting years	10			
Annual average over the crediting period	0	52,898	0	52,898

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

Data / Parameter	$EG_{facility,y}$
Unit	MWh
Description	Quantity of net electricity generation supplied to the grid by the project plant/unit to the grid in year y
Source of data	Credit notes for generation by MSEDCL
Value(s) applied	55,759
Measurement methods and procedures	Monitoring: These values are monitored through main and check meters having an accuracy class of 0.2 and located at the MSEDCL sub-station. Data type: Measured & Calculated Archiving: Electronic Recording Frequency: Continuous monitoring and at least monthly recording Responsibility: The plant management shall be responsible for the regular recording of data. Calibration Frequency: The meters shall be calibrated by the MSEDCL's testing division annually.
Monitoring frequency	Continuous monitoring and at least monthly recording
QA/QC procedures	The meters shall be calibrated by the MSEDCL's testing division annually. Generation values will be cross-checked with energy bill(s) at consumption centre by MSEDCL.
Purpose of data	Calculation of baseline emissions
Additional comment	The data will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later. In the case of the crediting period start & end dates of the project activity falls in – between the billing cycles, then emission reduction will be claimed for only those billing cycles which fall entirely within the crediting period.

B.7.2. Sampling plan

Not Applicable

B.7.3. Other elements of monitoring plan

The project activity is in accordance with in accordance to the approved methodology ACM0002, Version12.3.0, and therefore, can use the monitoring methodology for the same.

SIIL has outsourced the operations and monitoring the performances of the WTGs to Suzlon. The Operation &Maintenance (O&M) responsibility lies with Suzlon. The WTGs of Dhule are centrally connected & monitored by a Central Monitoring System (CMS) located at Dhule and maintained by Suzlon. The captured data from the CMS is then directly uploaded to the Customer Relationship Management (CRM) system, which is an Oracle based database. From the CRM, the daily generation reports are made available to SIIL on the customized website of the respective O&M service providers. The CRM manager is responsible for the monitoring of the WTGs and communicating results to SIIL.SIIL has the overall responsibility for collating the monitored data received from all the two locations. Two feeders of 22.5 MW each are dedicated for Suzlon -16 WTGs (10 nos on one feeder and 6 on the other) at the Sakri switchyard (33/132 KV) .The WTGs are connected through a 33 KV overhead line upto Sakri Switchyard. At the MSEDCL sub-station, the total export & import to these feeders is monitored using main & the check meters, which are electronic tri-vector meters. The total export at this meter is arrived at by multiplying the monthly meter reading to the multiplying factor of the meter concerned. The monthly meter reading is arrived at as the difference between the current meter reading and the previous meter reading. The period between these two readings is usually a period of 30 days which may vary. In a similar fashion, total import at this meter is also calculated.

Hence, net electricity export is calculated as the difference between total export and total import at the meter.

Additionally, MSEDCL receives daily export & import figures for each WTG from the O&M service provider with the help of which it calculates the electricity export by each WTG at the WTG controller. The WTG controller is located within the WTG assembly itself. It then arrives at the export value of each WTG by apportioning the reading of the main/check meter in the same ratio at which each of the WTG had exported electricity. The formula applied on each WTG of a particular feeder is as follows:

Net export of electricity from WTG to Grid

= (% generation of individual WTG connected to feeder) x (Net Electricity Export @ MSEDCL meter for the feeder)

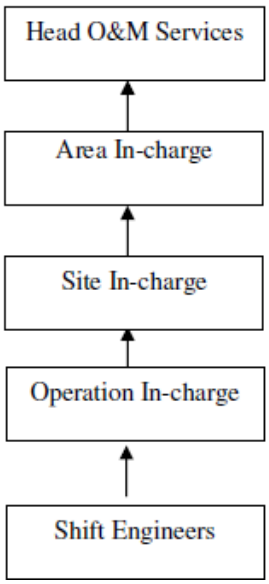
where, % generation of individual WTG connected to feeder

= (Controller reading @ Individual WTG)/(Sum of Controller reading of all WTGs connected on feeder)

The electricity export reports are generated by MSEDCL on credit notes and sent to SIIL through the O&M service provider on a monthly basis. Thus, to further elaborate, it may be said, that every month, SIIL receives credit notes from MSEDCL for each of its WTGs.

Based on these reports, the units billed at the consumption site/grid are adjusted as per the units of electricity generated at the power generation site after discounting wheeling and transmission losses as contained in the MERC order.

The structure of the O&M team is as follows:



The roles and responsibilities of the O&M personnel are as follows:

- Head O&M Services: He is in-charge of overall O&M activities of state/country. The responsibilities include formulation of procedures and decision-making for Operation &Maintenance team.
- Area in-charge: He is responsible for the defined areas with group of wind farms. He has to take timely corrective measures/action to ensure that overall performance of site is met and delivered.
- Site In-charge: He is responsible for daily monitoring of the performance of site operation and under any breakdown situation the WTG should be restored at earliest.
- Operation In-charge: He is responsible for attending the unscheduled breakdown of WTG and ensure that WTG should be restored at earliest. Daily monitoring of O & M team and performance of WTG.
- Shift Engineers: He is directly responsible for carrying out the O & M activity of WTG and to attend the breakdowns on immediate basis and report problem to Operation in charge.

Emergency Preparedness

In case of failure of monitoring meter(s), the grid officials would immediately replace the meter with a calibrated meter.

The O&M service provider would be responsible for maintenance of the necessary spare parts and consumables for the maintenance of the WTGs such as anemometers, wind vanes and sensors, oil filters, batteries, auxiliary motors and pumps, WTG controllers, slip rings, limit switches and sensors, detergents& solvents etc. The service provider will also be ensure the availability of major components such as main gearbox, blades, generator, towers, hub, main shaft & bearings, ground and top controller, cooling and hydraulic systems in the event of a breakdown occurring during the tenure of the O&M. The service provider would also ensure that occupational health and safety procedures are adhered to during the operation & maintenance activities.

The main meter will primarily be used for recording generation. In case of its failure, the check meter will be used for the same purpose. However, in case of failure of both meters, the emission reductions will be claimed only on the electricity consumed at the consumption centre. This value will be available in the MSEDCL bills for energy consumption at the site/grid.

Since, the electricity consumed is inclusive of transmission & wheeling losses, its conservativeness will be justified.

B.8. Date of completion of application of methodology and standardized baseline and contact information of responsible persons/ entities

SIIL and their associates.
Person Responsible: Mr. Santosh Tupe
Designation: Manager, Projects
Date of Completion: 15/11/2010
The detailed information is provided in Appendix I.

SECTION C. Duration and crediting period

C.1. Duration of project activity

C.1.1. Start date of project activity

5/08/2010- Date of signing of Supply Agreement of WTGs with Suzlon

C.1.2. Expected operational lifetime of project activity

20 Years 0 Months

C.2. Crediting period of project activity

C.2.1. Type of crediting period

Fixed crediting period

C.2.2. Start date of crediting period

01/07/2012(The start date of crediting period is 01/07/2012 or the date of registration of the project activity, whichever is later.)

C.2.3. Length of crediting period

10 years 0 Months

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

In the applicable EIA notification i.e. S.O. 3067, dated 01st December 2009, Ministry of Environment &Forests (MoEF), Govt. of India, the wind projects are not included in the list of projects that has to get Prior Environmental Clearance (EC) either from State or Central Govt. authorities and hence no EIA study was conducted.

The project does not fall under the purview of the Environmental Impact Assessment (EIA) notification of the Ministry of Environment and Forest, Government of India. However, due weightage has been given to environmental aspects.

Some of the environmental impacts taken into consideration during the construction and operation of the wind farm are as follows:

1. Land Use: Due consideration has been taken in order to ensure that the land available for the setting up of the wind farm has no alternative use. Furthermore, no forest land was used for the purpose. Appropriate measures were followed in order to prevent any soil erosion during the construction phase.
2. Noise Pollution: Typically, the wind farms are located in isolated areas and thereby the noise impacts on the neighbouring population are reduced. Also during the construction phase, suitable noise prevention and reduction measures were employed in order to reduce the ill-effects of noise pollution on the construction labourers.
3. Water Pollution: No water bodies exist in the area of the project activity. Suitable measures were adopted in order to prevent the contamination of water bodies during the construction phase, e.g. soak pits were provided for the colony of construction workers.
4. Air Pollution: The implementation of the project activity will reduce the dependence on fossil fuel generated power and thereby lead to the improvement in air quality during the operational phase. Regular wetting of approach roads was undertaken during the construction phase. This reduced the re-suspension of dust during the vehicle transits.
5. Visual Impact: As gathered in the stakeholder analysis, the wind mills do not have a negative impact on the surrounding villagers in terms of visual intrusion/impact.
6. Local Flora and Fauna: The land used for the purpose of setting up the wind farm was a barren land and therefore did not require any destruction of local flora. The only vegetation in the vicinity was shrubs and weeds.

Hence it can be concluded that the proposed project activity does not have any major negative impacts.

D.2. Environmental impact assessment

The environmental impacts of the project activity are not considered to be significant by the project participant or the host party.

SECTION E. Local stakeholder consultation

E.1. Solicitation of comments from local stakeholders

SIIL identified the following local stakeholders to be associated with the project activities, directly or indirectly:

1. Employees
2. Contractors/Technology Supplier Representatives
3. Local Villagers
4. Government officials (MSEDCL officials)

In order to address and incorporate the concerns of the local stake-holders, SIIL sent out invitation letters to all the stake-holders near the project location, Dhule 4-5 days in advance. The letter contained information of the date & site of the meeting along with a clear picture of the agenda of the meeting along with a broad description of the project activity. The meeting was conducted in the local language (Marathi) in order to allow the local stakeholders understand the project activity. The stakeholders were informed about the CDM project activity in detail and the project proponent also explained to them the various social and economic benefits of the project activity for the stakeholders. The stakeholders were then encouraged to ask any questions they had about the project and to express their views and comments with regards to the project activity.

The stakeholder meeting was conducted on 26/10/2010 at the project site.

E.2. Summary of comments received

The local villagers and the office bearers expressed their happiness with the setting up of an environment friendly power project in their village as it had resulted in generation of direct and indirect employment opportunities both for literate and illiterate people. They also hoped that with the setting up of wind power plant, the quality of power supply would also improve. Development of infrastructure in the locality was highly appreciated. The employees hired for the project activity from the local area stated that the project activity has provided them with a means of livelihood in their own village and will help them in getting equipped with technical skills.

E.3. Report on consideration of comments received

Serum Institute of India Limited has taken care of all the conditions stipulated in the relevant clearances and no adverse comment has been raised.

SECTION F. Approval and authorization

Submitted to the DOE for verification

Appendix 1. Contact information of project participants and responsible persons/ entities

Project participant and/or responsible person/ entity	☒ Project participant ☐ Responsible person/ entity for application of the selected methodology (ies) and, where applicable, the selected standardized baselines to the project activity
Organization name	Serum Institute of India Limited
Street/P.O. Box	Dr. Ambedkar Road,
Building	Sarosh Bhavan
City	Pune
State/Region	Maharashtra
Postcode	411 001
Country	India
Telephone	+91-20-26100324
Fax	+91-20-26993923
E-mail	-
Website	www.seruminstitute.com
Contact person	-
Title	Group Director (Accounts & Audit)
Salutation	Mr.
Last name	Deshpande
Middle name	-
First name	Satish
Department	Finance
Mobile	+91-9922940218
Direct fax	+91-20-26133228
Direct tel.	+91-20-26135311
Personal e-mail	shd@seruminstitute.com

Appendix 2. Affirmation regarding public funding

No public funding is available to the project activity from countries included in Annex- I.

Appendix 3. Applicability of methodology and standardized baseline

The latest data available has been used for the estimation of the baseline emissions. The Central Electricity Authority (CEA) under the Ministry of Power, Government of India, has estimated the Build Margin and the Simple Operating Margin for the NEWNE grid, the details of which is available on the following website and is detailed below as well:

http://www.cea.nic.in/planning/c%20and%20e/government%20of%20india%20website.htm

Version 6.0 of the database has been used.

Gross Generation Total (GWh)

	2007-08	2008-09	2009-10
NEWNE	531,539	548,956	586,311

Net Generation Total (GWh)

	2007-08	2008-09	2009-10
NEWNE	496,119	510,693	544,915

20% of Net Generation (GWh)

	2007-08	2008-09	2009-10
NEWNE	99,224	102,139	108,983

Net Generation in Operating Margin (GWh)

	2007-08	2008-09	2009-10
NEWNE	401,642	421,803	458,043

Net Generation in Build Margin (GWh)

	2007-08	2008-09	2009-10
NEWNE	100,707	102,589	109,064

Share of Must-Run (Hydro/Nuclear) (% of Net Generation)

	2005-06	2006-07	2007-08	2008-09	2009-10
NEWNE	18.0%	18.5%	19.0%	17.3%	15.9%

Imports

	2007-08	2008-09	2009-10
NEWNE	8,482.5	5,897.1	5341.1

Emission Data

Absolute Emissions Total (tCO2)

	2007-08	2008-09	2009-10
NEWNE	406,861,785	430,502,441	453,067,520

Absolute Emissions OM (tCO2)

	2007-08	2008-09	2009-10
NEWNE	406,861,785	430,502,441	453,067,520

Absolute Emissions BM (tCO2)

	2007-08	2008-09	2009-10
NEWNE	60,193,616	69,297,387	88,593,337

Emission Factor

Simple Operating Margin (tCO2/MWh) (incl. Imports)

	2007-08	2008-09	2009-10
NEWNE	1.00	1.01	0.98

Build Margin (tCO2/MWh) (not adjusted for imports)

	2007-08	2008-09	2009-10
NEWNE	0.60	0.68	0.81

Appendix 4. Further background information on ex ante calculation of emission reductions

Please refer section B.6.3

Appendix 5. Further background information on monitoring plan

Kindly refer section B.7.1 and B.7.2

Appendix 6. Summary of post registration changes

The project was initially conceptualized for captive consumption of electricity generated from the project activity. However, during the operational phase, due to change in government policies, the project used the electricity for captive purpose while at times it had to sell the electricity either to third party or the grid.

In the future as well, the project proponent would either use the electricity for captive purpose or it may sell the electricity either to third party, power exchange or to the grid, based on the regulatory policy applicable at that time.

Additionality Analysis:
As per details mentioned under section B.5 above, the revised IRR based on the design changes comes to 16.69% which is lower than the benchmark of 19.75%.

Thus the additionality is not impacted by the Design changes made for the project activity.

Annex 1

Community Development:
SIIL would also use at a minimum, 2% of the revenues accrued from the sale of Certified Emission Reductions (CERs) on an annual basis for community related activities. The details of such expenditure made would be included in the monitoring report for the period following the transaction and the format proposed by SIIL is as follows:

Action Plan for expenditure incurred through 2% of CER revenues									
Financial Year (A)	**Activity (B)**	**Issued CERs (C)**	**CER Price (D)**	**Total CDM Amount (E=CxD)**	**Expenditure in Current year (F)**	**Expenditure Carried forward (G)**	**Net Expenditure for Current Year (H = F+G)**	**Expenditure as % of CDM amount for current year (I = H/E)**	**Reference Documentation (J)**
Indicates the year for which the assessment is being provided	Provides details of the social/ community activities on which the expenditure has been incurred	Quantity of CERs issued for the assessment year	CER price at which the transaction has happened	Total amount CDM amount received	Expenditure made on the social/ community development activity in the current assessment year	Additional expenditure incurred on capital goods in the previous assessment years being carried forward to the current assessment year	Net Expenditure on social/ community development activity for the current year	Indicates the % of the total CDM amount spent on social/community development activity	Indicates the documentation to be provided to the DOE during the verification to evidence the amount spent on social/ community development activity

- - - - -

Document information

Version	*Date*	*Description*
08.0	22 July 2016	EB 90, Annex 1 Revision to include provisions related to automatically additional project activities.
07.0	15 April 2016	Revision to ensure consistency with the “Standard: Applicability of sectoral scopes” (CDM-EB88-A04-STAN) (version 01.0).
06.0	9 March 2015	Revisions to: • Include provisions related to statement on erroneous inclusion of a CPA; • Include provisions related to delayed submission of a monitoring plan; • Provisions related to local stakeholder consultation; • Provisions related to the Host Party; Editorial improvement.
05.0	25 June 2014	Revisions to: • Include the Attachment: Instructions for filling out the project design document form for CDM project activities (these instructions supersede the "Guidelines for completing the project design document form" (Version 01.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for the application of the methodology (ies) to the project activity in B.7.4 and Appendix 1; • Change the reference number from *F-CDM-PDD* to *CDM-PDD-FORM;* • Editorial improvement.
04.1	11 April 2012	• Editorial revision to change version 02 line in history box from Annex 06 to Annex 06b
04.0	13 March 2012	Revision required to ensure consistency with the “Guidelines for completing the project design document form for CDM project activities” (EB 66, Annex 8).
03.0	26 July 2006	EB 25, Annex 15
02.0	14 June 2004	EB 14, Annex 06b
01.0	03 August 2002	EB 05, Paragraph 12 Initial adoption.

Version	Date	Description

Decision Class: Regulatory
Document Type: Form
Business Function: Registration
Keywords: project activities, project design document